

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Feed Device for Injection Moulding Machines

5 We, VEB PRESSENWERK FREITAL, of 14, Hüttenstrasse, Freital I, Germany, a Corporation organised under the laws of Eastern Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a feed device for injection moulding machines having an injection cylinder in which is arranged a rotating plasticiser worm, and an inlet shaft arranged in said cylinder.

15 In order to be able to work up rubber or similar material, usually supplied by the manufacturer in the form of bands wound into rolls, in injection moulding machines, it is necessary among other things to modify the feed conditions with respect to the plasticiser worm of the injection moulding machine.

20 It has been attempted to work up rubber in granulated form in injection moulding machines. As granulated rubber is comparatively expensive, and the grains of rubber frequently tend to stick together, which makes treatment by the injection moulding process more difficult, it was attempted to draw into conventional worm injection moulding machines rubber in band form and to treat the same therein. In doing this it was found that the drawing-in capacity of the worm and hence the speed with which the band of rubber is drawn in is very small. It was also found that as soon as it is gripped by the plasticiser worm the band of rubber is severed by the turns of the worm, so that a continuous drawing in of the rubber band was not practicable. The working up of rubber is also made difficult by the fact that the manufacturers deliver the material in a great variety of band widths and thicknesses.

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A device is furthermore known in association with extruders for treating rubber whereby the band of rubber is fed to the plasticiser worm with the aid of a feed roller.

45 This feed roll is arranged parallel to and contacts the plasticiser worm and is driven by said worm through the medium of a gear. The worm and feed roller operate in contrary directions to one another, whereby the rubber band being supplied is gripped in the nip between the worm and the roller and drawn into the injection cylinder.

50 However, this device cannot be simply applied to injection moulding machines without involving additional outlay, as its construction requires axially fixed worms. In injection moulding machines, however, the worm must be arranged to be axially displaceable so as to be able to press the plasticised material out of the injection cylinder into the injection moulding tool.

55 It is an object of the present invention to provide a device for injection moulding machines which makes it possible, with but little outlay, to draw in rubber in the form of bands continuously into the injection cylinder.

60 It is a further object of the invention to modify the injection cylinder, plasticiser worm and drawing-in shaft in such a manner as to create drawing-in conditions, suitable to the material to be treated.

65 To this end, the present invention consists in a feed device for injection moulding machines having an injection cylinder accommodating a rotating plasticiser worm and an inlet shaft arranged thereon, characterised in that the inlet shaft is arranged perpendicularly to the longitudinal axis of the plasticiser worm, the inner wall of the injection cylinder adjacent the inlet zone has a tapered

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recess leading to the worm, and the threads of the plasticiser worm participating in the drawing-in action have a smaller diameter than those of the conveying zone of the worm. Preferably, the inlet shaft is constituted by an exchangeable bushing. The flanks of the worm threads facing the direction of extrusion are preferably provided with rounded edges. Preferably also, the peripheral surfaces of the worm threads which face the inner wall of the injection cylinder are provided with a knurled edge or toothing, at least on the worm threads taking part in the drawing-in action.

The advantage of the device according to the invention consists in its costing little and in the fact that rubber in the form of bands can be continuously drawn into the injection cylinder and treated therein.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate diagrammatically and by way of example, two embodiments thereof, and in which:—

Figure 1 is a sectional view of an embodiment;

Figure 2 is a similar view of a modified embodiment;

Figure 3 is a detail of a worm thread;

Figure 4 is a section taken on the line IV—IV of Figure 1; and

Figure 5 is a part section taken on the line V—V of Figure 3.

In an injection cylinder 1 is arranged a rotating, axially displaceable plasticiser worm 2. The injection cylinder 1 has an inlet shaft 3 with guide surfaces 4, 4'. The guide surface 4' is arranged tangentially to the periphery of the plasticiser worm 2. In the region of the inlet zone the inner wall of the injection cylinder 1 is provided with a recess 5 tapered towards the direction in which the material is conveyed by the plasticiser worm 2. The worm threads 6 which participate in drawing-in the material, for example, a rubber band, have rounded edges 7 on the flanks facing the conveying direction. The circumference of this worm thread 6 is smaller than that of the other worm threads 8. The peripheral surfaces of the threads 6, facing the inner wall of the injection cylinder 1, are provided with a knurled edge or toothing 9.

In the embodiment of Figure 2, an exchangeable bushing 10 is arranged in the injection cylinder 1. This forms the draw-in shaft 3 and is so constructed that it gradually widens the injection cylinder 1 in the region of the inlet zone in the direction opposite to the conveying direction of the plasticiser worm 2.

The device according to the invention operates as follows:—

The plasticiser worm rotates in the injection cylinder 1. The material to be worked up,

in the form of a band of rubber, is introduced into the inlet shaft 3. The rubber band is pushed in tangentially by the guide surface 4', disposed tangentially to the circumference of the worm, between said worm circumference and the inner wall of the cylinder. At this point it is seized by the surfaces of the worm threads 6, provided with a knurled edge or toothing 9, and drawn into the cylindrical chamber of the injection cylinder 1. The tapered recess 5 of the cylinder 1 and the rounded edges 7 of the worm threads 6 serve to prevent the rubber band from being severed when gripped by the worm threads 6. As soon as the worm threads 6 have gripped the rubber band, the knurled edge 9 buries itself in the rubber band lying against the inner wall of the injection cylinder 1. On the further rotation of the plasticiser worm 2 the rubber band is drawn into the injection cylinder 1, while automatically unwinding itself from the roll. In the injection cylinder 1 the rubber is plasticised and conveyed in front of the worm head, displacing the plasticiser worm 2 axially, whereby the worm threads 6 taking part in the drawing in of the band are changed and the draw-in zone of the plasticiser worm 2 is displaced.

When the bushing 10 is used the apparatus works in the same way as already described. The advantage however resides in the fact that when it is required to treat a rubber band with other widths and thicknesses, by incorporating a more suitable bushing 10 the good drawing-in conditions of the device according to the invention are preserved.

#### WHAT WE CLAIM IS:—

1. A feed device for injection moulding machines having an injection cylinder accommodating a rotating plasticiser worm and an inlet shaft arranged thereon, characterised in that the inlet shaft is arranged perpendicularly to the longitudinal axis of the plasticiser worm, the inner wall of the injection cylinder adjacent the inlet zone has a tapered recess leading to the worm, and the threads of the plasticiser worm participating in the drawing-in action have a smaller diameter than those of the conveying zone of the worm.

2. A feed device as claimed in Claim 1, wherein the inlet shaft is constituted by an exchangeable bushing.

3. A feed device as claimed in Claim 1 or 2, wherein the flanks of the worm threads facing the conveying direction have rounded edges.

4. A feed device as claimed in Claim 1, 2 or 3, wherein the peripheral surfaces of at least the worm threads taking part in the drawing-in action and which face the inner wall of the cylinder are provided with a knurled edge or toothing.

5. A feed device for injection moulding machines, substantially as herein described

and with reference to the accompanying drawings.

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1 SHEET

This drawing is a reproduction of  
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